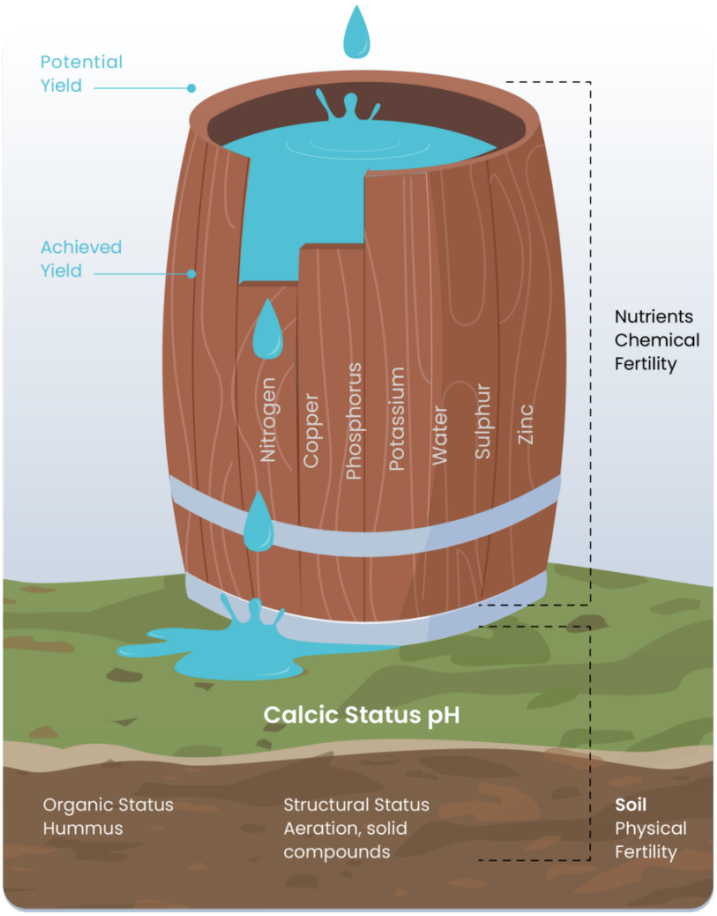
Plant nutrients مغذي النباتات



Plant nutrients are chemical elements essential for proper plant growth and development, categorized as macronutrients (required in large amounts, like nitrogen (N), phosphorus (P), and potassium (K)) and micronutrients (needed in smaller quantities, including iron (Fe), manganese (Mn), and zinc (Zn)). Plants absorb carbon and oxygen from the air and other essential nutrients, such as nitrogen, phosphorus, and potassium, from the soil through their roots.

1. Major Plant Nutrients:

The 17 essential nutrients for plants are divided into categories based on how much the plant needs:

- Primary Macronutrients (The Big 3):

Needed in the largest amounts.

*** Nitrogen (N):** Crucial for protein, chlorophyll, and overall plant growth and development.

*** Phosphorus (P):** Essential for root development, energy storage, and seed and fruit formation.

*** Potassium (K):** Improves plant strength, helps regulate water balance, and activates enzymes for growth.

2. Secondary Macronutrients:

Required in moderate amounts.

*** Calcium (Ca):** A structural component of cell walls and necessary for cell growth and division.

*** Magnesium (Mg):** A vital component of chlorophyll and necessary for enzyme function.

*** Sulfur (S):** A structural component of amino acids, proteins, and enzymes.

- Micronutrients:
Needed in very small quantities but are still vital for plant function.
Iron (Fe)
Boron (B)
Manganese (Mn)
Zinc (Zn)
Copper (Cu)
Molybdenum (Mo)
Chlorine (Cl)
Nickel (Ni)

- Sources and Absorption:
1. Air and Water:
Plants get carbon, oxygen, and hydrogen from the air (carbon dioxide) and water.
2. Soil:
Most other nutrients are absorbed by the plant's root system from the soil as dissolved ions.
3. Fertilizers:
Nutrients not available in sufficient quantities from the environment can be supplemented through fertilizers.

- Roles in Plant Life:

1. Growth:

Nutrients like nitrogen promote leaf and shoot development, while phosphorus is critical for roots and flowering.

2. Metabolism:

Magnesium and iron are essential for chlorophyll synthesis, the process of photosynthesis.

3. Health:

Potassium helps with stress tolerance and water regulation, contributing to overall plant health and yield.

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Resources:

https://extension.umn.edu/manage-soil-nutrients/quick-guide-fertilizing-plants

https://www.fertilizerseurope.com/fertilizers-in-europe/balanced-plant-nutrition/

https://cropaia.com/blog/plant-nutrients/

https://nutrien-ekonomics.com/news/what-are-all-the-essential-nutrients-for-plant-growth/

https://www.syfert.net/resources/fertilizer-101-the-big-3-nitrogen-phosphorus.html

https://convoyofhope.org/articles/plant-nutrients/

https://www.dpi.nsw.gov.au/agriculture/soils/soil-testing-and-analysis/plant-nutrients

https://www.agrivi.com/blog/the-basics-of-plant-nutrient-management/

https://yarafert.com/plant-nutrients/

https://vlsci.com/blog/essential-plant-nutrients/